Docket No. YOR920030340US1
Confirmation No.:4997

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

Applicants(s): Bedell et al.
Case: YOR920030340US1
Serial No.: 10/685,636
Filing Date: October 15, 2003
Group: 2811
Examiner: H.K. Vu

Title: Techniques for Layer Transfer Processing

TWICE CORRECTED APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Appellants hereby submit this Corrected Appeal Brief to conform to the current format requirements. In particular, the evidence cited in the Evidence Appendix of the original Appeal Brief has been removed from the Twice Corrected Appeal Brief. The original Appeal Brief was submitted on March 8, 2007 to appeal the final rejection dated September 26, 2006, of claims 1 through 11 of the above-identified patent application.

REAL PARTY IN INTEREST

The present application is assigned to International Business Machines Corporation, as evidenced by an assignment recorded on February 23, 2004 in the United States Patent and Trademark Office at Reel 014367, Frame 0376. The assignee, International Business Machines Corporation, is the real party in interest.

RELATED APPEALS AND INTERFERENCES

There are no related appeals and interferences.

STATUS OF CLAIMS

Claims 12-48 were withdrawn from consideration in response to a previous restriction requirement. Claims 1-11 are presently pending in the above-identified patent application. Claims 1-8 and 10-11 are rejected under 35 U.S.C. §102(b) as being anticipated by Sakaguchi et al. (U.S. Patent No. 6,306,729) and claim 9 is rejected under 35 U.S.C. §103(a) as being unpatentable over Sakaguchi et al. Claims 1, 2, and 6 are being appealed.

STATUS OF AMENDMENTS

There have been no amendments filed subsequent to the final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 is directed to a layer transfer structure (FIGS. 4 and 5) comprising a carrier substrate (FIG. 4: 100) having a porous region (FIG. 4: 120) with a tuned porosity (page 5, lines 19-23) in combination with an implanted-species (page 8, lines 1-3) positioned therein defining a separation plane (page 8, lines 1-3) in the carrier substrate (page 7, line 9, to page 8, line 3).

In one exemplary embodiment, the separation plane is defined by a position and an amount of the implanted species (page 8, line 20, to page 9, line 4).

In another exemplary embodiment, the porous region comprises a varied porosity (page 8, line 20, to page 9, line 4).

STATEMENT OF GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-8 and 10-11 are rejected under 35 U.S.C. §102(b) as being anticipated by Sakaguchi et al. and claim 9 is rejected under 35 U.S.C. §103(a) as being unpatentable over Sakaguchi et al.

ARGUMENT

Independent Claim 1

Independent claim 1 is rejected under 35 U.S.C. §102(b) as being anticipated by Sakaguchi et al. In particular, the Examiner asserts that Sakaguchi discloses a carrier substrate (11) having a porous region (13, 33, 43) with a tuned porosity in combination with a species (doped) positioned therein defining a separation plane in the carrier substrate. The Examiner further asserts that the term "implanted" is method recitation in a device claimed and that, even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The Examiner asserts that Sakaguchi discloses the porous region is doped by diffusion, ion implantation or epitaxial growth.

Appellants note that Sakaguchi teaches a doped layer 12 (col. 3, lines 40-48, and col. 18, lines 44-52). Sakaguchi teaches that the "*porous layer 13* that operates as a separation layer shows a ***uniform*** *dopant concentration*." (Col. 4, lines 19-22; emphasis added.) Independent claim 1 emphasizes that the carrier substrate has a porous region with a tuned porosity in combination with *an implanted species* positioned therein defining a separation plane in the carrier substrate.

First, Appellants assert that the "implanted species" limitation in claim 1 is a valid limitation for a structure claim, notwithstanding the Examiner's position in the original Office Action. The Examiner asserts that the "implanted species" limitation is a method recitation in a device and that the patentability of a product does not depend on its method of production. Appellants submit, however, that the "implanted species" limitation in claim 1 is not a method recitation nor merely an indication of the method of production. Rather, as discussed more fully below, the "implanted species" limitation clearly defines a *characteristic* of the structure itself. As such, the "implanted species" limitation is a valid limitation for a structure claim.

Appellants further submit that the "implanted species" limitation more particularly points out and distinctly claims the invention, consistent with Section 112. The scope and meaning of the "implanted species" limitation is well defined and well understood by a person of ordinary skill in the art.

As indicated above, the "implanted species" limitation clearly defines a *characteristic* of the structure itself. The present disclosure teaches, for example, that

> double-implantation layer techniques may comprise the following steps. A first implantation with boron is performed, followed by a second implantation with a group IVB species, such as silicon. The second implantation is targeted to implant a thinner region than the first implantation to create a sharp interface definition.
>
> Activation of the boron implant by annealing is performed followed by anodization of the silicon to create the two regions of different porosity. An important aspect of the techniques provided herein is that to obtain various porosities, the anodization process does not have to be altered, i.e., the whole anodization process is performed at the same conditions (one anodization step). *Another benefit is that well controlled tunability of the process is accomplished by* ***varying the amount, i.e., dose and the position, i.e., depth of the implanted ions****, providing needed stability of this bi-layer during further decal processing, but at the same time, enabling easy separation when release process is required.* This well controlled tunability is essential to enable the structure to withstand the various processing steps required for the formation of the device, interconnect and packaging structures in the decal layer while it is still supported on the carrier substrate.
>
> (Page 8, line 15, to page 9, line 4; emphasis added.)

This characteristic is not shown or suggested by Sakaguchi et al. As well understood by a person of ordinary skill, an implantation of a species into a carrier substrate creates a unique distribution of the species in the substrate. For example, implantation infers that the species is positioned at certain locations within the substrate (e.g., the species has a Gaussian distribution); doping does not provide for positioning a species at certain locations within the doped region. The degree of porosity (i.e., the "tuned porosity") tracks this distribution. In other words, the porosity is tuned in accordance with the implantation profile. The implantation defines the separation plane. In other words, the separation plane in the carrier substrate is defined by having a porous region with a tuned porosity in combination with *an implanted species* positioned therein, as set forth in claim 1. Sakaguchi, alternatively, teaches a *uniform distribution with characteristics that are defined by the doping process*.

Thus, Appellants maintain that implantation is *not* equivalent to doping, as would be apparent to a person of ordinary skill in the art. For example, ion implantation can be performed without doping; either by ion implanting non-dopant atoms, or by

implanting dopant atoms and not performing adequate thermal annealing (a process called dopant-activation). As a counter-example, doping can be performed without ion implantation (epitaxial growth, gas-phase diffusion, or solid-state diffusion, for example). Moreover, it should be noted that ion implantation may introduce more than just dopant atoms; it may introduce lattice strain, point- and extended-crystal defects, whereas methods of doping do not. The structural differences that arise between these different methods are an indication of the non-obvious nature of the present invention. In fact, in one aspect of the present invention, the invention is doped+damaged. Sakaguchi does *not* teach the conditions necessary to make this different stucture separable.

Thus, Sakaguchi et al. do not disclose or suggest a "carrier substrate having a porous region with a tuned porosity in combination with *an implanted species* positioned therein defining a separation plane in the carrier substrate," as required by claim 1. As such, reconsideration and withdrawal of the rejections is thus respectfully requested.

<u>Claim 2</u>

Claim 2 is rejected under 35 U.S.C. §102(b) as being anticipated by Sakaguchi et al. Regarding claim 2, the Examiner asserts that the limitation "the separation plane is defined by a position and an amount of the implanted species" is a method recitation in a device claim.

Appellants note that the position and amount of the implanted species is a characteristic of the separation plane and is therefore *not a method recitation*. Appellants can find no disclosure or suggestion in Sakaguchi of a separation plane that is defined by a position and an amount of the implanted species.

Thus, Sakaguchi et al. do not disclose or suggest wherein the separation plane is defined by a position and an amount of the implanted species, as required by claim 2.

<u>Claim 6</u>

Claim 6 is rejected under 35 U.S.C. §102(b) as being anticipated by Sakaguchi et al. Regarding claim 6, the Examiner asserts that Sakaguchi discloses that "the porous region comprises a varied porosity" (33, 34).

Appellants note that, regarding layers 33 and 34, Sakaguchi teaches that

> the obtained multilayer structure is then separated by any of the above-listed techniques (Step S5, FIG. 6). Since the porous layer comprises a plurality *of sub-layers 33, 43 having different respective porosities* in this embodiment, the separation of the two articles will be easier and the technique of causing a fluid jet stream to hit a lateral side (edge) of the multilayer structure will advantageously be used.
> (Col. 18, line 66, to col. 19, line 6; emphasis added.)

Appellants note that Sakaguchi teaches *two **different** layers of different porosity*. Appellants can find no disclosure or suggestion in Sakaguchi that the *porous region comprises a **varied** porosity*, as defined in the art and as well understood by a person of ordinary skill in the art.

Thus, Sakaguchi et al. do not disclose or suggest wherein the porous region comprises a varied porosity, as required by claim 6.

Conclusion

The rejections of the cited claims under sections 102 and 103 in view of Sakaguchi et al. are therefore believed to be improper and should be withdrawn. The remaining rejected dependent claims are believed allowable for at least the reasons identified above with respect to the independent claims.

The attention of the Examiner and the Appeal Board to this matter is appreciated.

Respectfully,

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Date: October 17, 2007

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APPENDIX

1. A layer transfer structure comprising a carrier substrate having a porous region with a tuned porosity in combination with an implanted-species positioned therein defining a separation plane in the carrier substrate.

2. The structure of claim 1, wherein the separation plane is defined by a position and an amount of the implanted species.

3. The structure of claim 1, further comprising a transfer layer on the carrier substrate.

4. The structure of claim 1, further comprising a tunable thermally regrown epitaxial layer.

5. The structure of claim 4, wherein a component selected from the group consisting of a device layer, an interposer structure, a functional layer and combinations comprising at least one of the foregoing components is formed in the tunable thermally regrown epitaxial layer.

6. The structure of claim 1, wherein the porous region comprises a varied porosity.

7. The structure of claim 1, wherein the porous region comprises at least two different porosities.

8. The structure of claim 1, wherein the implanted species are selected from the group consisting of dopants, non-dopant ions and combinations comprising at least one of the foregoing species.

9. The structure of claim 1, wherein the implanted species comprise silicon

ions.

10. The structure of claim 1, wherein the carrier substrate comprises silicon.

11. The structure of claim 3, wherein the transfer layer is formed by a process selected from the group consisting of spin on coating, plasma enhanced deposition, physical vapor deposition, chemical vapor deposition, patterning methods and combinations comprising at least one of the foregoing process.

12-48. (Withdrawn)

EVIDENCE APPENDIX

There is no evidence submitted pursuant to § 1.130, 1.131, or 1.132 or entered by the Examiner and relied upon by appellant.

RELATED PROCEEDINGS APPENDIX

There are no known decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 CFR 41.37.